ADOPTION NOTICE

AMS 5614, "Steel, Corrosion and Heat Resistant, Bars, Wire, and Forgings 12Cr-0.50Mo Annealed was adopted on 17 January 1995 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Air Force, ASC/ENSI, Building 125, 2335 Seventh Street, Suite 6, Wright-Patterson AFB OH45433-7809. DoD activities may obtain copies of this standard from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. The private sector and other Government agencies may purchase copies from the Society of Automotive Engineers Inc., 400 CommonweaIth Drive, Warrendale, PA 15096-0001.

Custodians:
Army - MR
Navy - AS
Air Force - 11

Adopting Activity:
Air Force - 11
(Proj No. 9510-0926)

Review activities:
AF - 99

AMSC N/A

FSC 9510

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5614D

Issued JUN 1952
Revised FEB 1995

Superseding AMS 5614C

Submitted for recognition as an American National Standard

STEEL, CORROSION AND HEAT RESISTANT, BARS, WIRE, AND FORGINGS
12Cr - 0.50Mo
Annealed

UNS S41025

1. SCOPE:

1.1 Form:

This specification covers a corrosion and heat resistant steel in the form of bars, wire, forgings, and forging stock.

1.2 Application:

These products have been used typically for parts, such as compressor blades and vanes, requiring oxidation resistance up to 1000 ºF (538 ºC) but useful at the higher temperatures only when stresses are low, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2241 Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
MAM 2241 Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS 2248 Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS 2371 Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2374 Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Forgings

2.1 SAE Publications: (Continued)

AMS 2806 Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat Resistant Steels and Alloys
AMS 2808 Identification, Forgings

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM A 370 Mechanical Testing of Steel Products
ASTM E 340 Macroetching Metals and Alloys
ASTM E 353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys
ASTM E 381 Macroetch Testing, Inspection and Rating Steel Products, Comprising Bars, Billets, Blooms, and Forgings

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	0.07	0.12
Manganese	0.30	0.60
Silicon	--	0.35
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	11.50	12.50
Molybdenum	0.40	0.60
Nickel	--	0.60
Copper	--	0.50
Aluminum	--	0.05
Tin	--	0.05
Nitrogen	--	0.08

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

3.2 Condition:

The product shall be supplied in the following condition; hardness and tensile strength shall be determined in accordance with ASTM A 370:

3.2.1 Bars: Hot rolled, annealed, and descaled or hot rolled, annealed, and ground having hardness not higher than 223 HB, or equivalent (See 8.2).

3.2.2 Wire: Cold drawn and annealed having tensile strength not higher then 115 ksi (793 MPa).

3.2.3 Forgings: As ordered.

3.2.4 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties:

The product shall conform to the following requirements; tensile and hardness testing shall be performed in accordance with ASTM A 370:

3.3.1 Macrostructure: Visual examination of transverse sections as in 4.3.3 from bars, wire, billets, and forging stock, etched in hot hydrochloric acid in accordance with ASTM E 340 shall show no pipe or cracks. Porosity, segregation, inclusions, and other imperfections shall be no worse than the macrographs of ASTM E 381 agreed upon by purchaser and vendor.

3.3.2 Response to Heat Treatment: Product 7.0 inches (178 mm) and under in nominal diameter or distance between parallel sides shall have the following properties after being hardened by heating to 1750 ºF ± 10 (954 ºC ± 5), holding at heat for 25 to 30 minutes, and cooling in air and tempered by heating to a temperature not lower than 1100 ºF (593 ºC), holding at heat for 60 minutes ± 5, and cooling in air:

3.3.2.1 Tensile Properties: Shall be as shown in Table 2; requirements apply in both the longitudinal and transverse directions but tests in the transverse direction need be made only on product from which a specimen not less than 2.50 inches (63.5 mm) in length can be taken midway between the surface and the center. Tests in the longitudinal direction are not required on product tested in the transverse direction.

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	100 ksi (689 MPa)
Yield Strength at 0.2% Offset	80.0 ksi (552 MPa)
Elongation in 4D	21%
Reduction of Area	60%

3.3.2.2 Hardness: Product, 0.375 inch (9.52 mm) and under in nominal diameter or distance between parallel sides and specimens 0.375 inch ± 0.010 (9.52 mm ± 0.25) thick cut from larger product, shall have hardness of 217 to 248 HB, or equivalent (See 8.2).

3.4 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.4.1 Grain flow of die forgings, except in areas which contain flash-line end grain, shall follow the general contour of the forgings showing no evidence of re-entrant grain flow.

3.5 Tolerances:

Bars and wire shall conform to all applicable requirements of AMS 2241 or MAM 2241.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

Tests for all technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing:
(R) Shall be as follows:

4.3.1 Bars, Wire, and Forging Stock: In accordance with AMS 2371 except as specified in 4.3.3.
(R)